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CONSUMER EVALUATION OF MECHANICALLY HARVESTED SUN DRIED RAISINS

by
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ABSTRACT

Economic and consumer evaluations of raisins produced from mechanically harvested grapes were conducted. Preliminary estimates of costs per acre for the mechanical harvesting of grapes for raisins indicate a reduction of $15 per acre from the costs of hand harvesting. Product evaluations indicated that most consumers could not tell the difference between the mechanically harvested raisins and hand picked raisins.

Keywords: raisins, harvesting, cost, product evaluation.

The Central Valley of California produces about 40 percent of the world raisin crop. In the past 5 years, California's raisin crop has averaged 216,000 tons annually, primarily from Thompson Seedless grapes. Most (90 percent) were sun dried. Raisins were first produced in California in 1873 and the method of harvesting and drying the grapes has not changed essentially since that time. The grapes are cut from the vine by hand in whole clusters and placed on paper trays between the vine rows to sun dry. After the grapes have dried to a moisture content of less than 16 percent, they are put in boxes and taken to a processing plant for cleaning, grading, and packaging. The entire procedure takes about 21 days and requires considerable hand labor. The decrease in availability of workers and the increase in costs have resulted in a search for new methods that will result in lower production costs.

Mechanical Harvesting

One method that has been developed is the mechanical harvesting of raisin grapes followed by sun drying. The California State University at Fresno and the Western Regional Research Center, Albany, Calif. have collaborated in a joint research project to determine the commercial feasibility of this method. With this method, the fruit-bearing canes are cut several days prior to harvest to initiate drying and to facilitate harvesting. The mechanical harvester dislodges the grapes as single berries which are deposited onto a continuous paper tray automatically laid behind the harvester.[2] In about 10 to 12 days, when the grapes have dried to a moisture content of less than 16 percent, they are mechanically picked up and conveyed to bins for delivery to the processing plant. This process eliminates several days of drying time and thus reduces the risk of damage due to insects, rodents, birds, and rain.

Preliminary estimates of costs per acre for the mechanical harvesting of grapes for raisins indicate a reduction of $15 per acre from the costs of hand harvesting (table 16). These costs are based upon actual and estimated costs provided by farmers involved in the research project.

Product Evaluation

Panel evaluations of mechanically harvested and hand-picked raisins conducted at the Western Center indicate no differences in flavor but a detectable

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[1] National Economic Analysis Division, Enonomic Research Service of the U.S. Department of Agriculture, Albany, Calif. and Professor of Viticulture in the Department of Plant Science, California State University at Fresno, Calif., respectively.

[2] Studer, H.E., and H.P. Olmo. The Severed Cane Technique and its Application to Mechanical Harvesting of Raisin Grapes. Transactions of American Society of Agricultural Engineers. Vol. 14, 1:38-43. 1971.

Table 16--Estimate of costs for harvesting raisins, mechanical versus hand picked, Fresno, California, 1973 season[1]

Operation	Mechanically harvested	Hand picked
	- Dollars per acre -	
1. Ground preparation - terrace and disc	5.00	5.00
2. Cut canes (3 man hrs./acre @ $3.00)	9.00	-
3. Harvest: Machine - ($11.00/ton of grapes)	110.00[2]	-
Hand - 1,000 paper trays @ 12.0¢	-	120.00
4. Tray laying device for spreading fruit on continuous paper tray	15.00	-
5. Turn and roll - 1,000 trays @ 3.0¢	-	30.00
6. Paper: Continuous roll	12.00	-
1,000 trays @ 1.3¢	-	13.00
7. Pickup and boxing machine	20.00	-
8. Semi-automatic pickup machine and 3 man hrs./acre boxing labor	-	18.00
9. Delivery from field to processing plant	9.00	9.00
10. Crop insurance	13.00	13.00
11. Miscellaneous	5.00	5.00
Total harvest cost	198.00	213.00[3]

[1] Based on 10 green tons/acre or 2.25 dry tons. Cost data provided by two raisin producers who participated with California State University, Fresno, in this research project.

[2] This is a custom charge.

[3] Similar to costs of $206/ton estimated by Agricultural Extension, University of California, "1972 Grape Production Costs in the San Joaquin Valley, Thompson Seedless for Raisins or Wine," AXT-50, Rev. 11/72.

difference in appearance.[3] The mechanically harvested raisins have a shinier appearance than the hand-picked raisins. To determine consumer acceptance of these raisins, Federal employees located at the Western and Southern Regional Research Centers were given samples of both mechanically harvested and hand-picked sun-dried raisins to evaluate at home. Seventy-eight respondents at the Southern Center in New Orleans and 107 at the Western Center in Albany representing all age groups and household sizes participated in the study. Persons who disliked raisins were not included in the study. The study was conducted from April to September 1972.[4]

Each respondent was given a 1-pound box of raisins. Half of the respondents received mechanically harvested raisins and the other half received hand-picked raisins. The boxes were coded, thus the respondents did not know which type of raisin they received. Respondents were instructed to use the raisins in ways which they normally use them, and to then complete a questionnaire evaluating the raisins they had received. Several weeks later, the respondents who had received mechanically harvested raisins received samples of hand-picked ones and vice versa. Again they were asked to complete a questionnaire evaluating the raisins they had received.

The results of the evaluation indicate that most respondents could not tell the difference between the two types of raisins. Where differences were noted, they were nearly always in favor of the mechanically harvested raisins.

Almost all of the respondents ate the raisins out of hand; however, many also used them in baked goods, salads, and in cold cereals (table 17). Only a few respondents indicated that they used them in hot cereals. Some other uses were as a condiment, in curry, in casseroles, and with ice cream.

The majority of respondents could not tell the difference between the two samples of raisins and the raisins that they usually used (table 17). Where differences were noted, the mechanically harvested raisins got a better rating than the hand picked.

When respondents compared the raisins received in the second sample with those in the first sample, many could not taste any difference (table 18). Where differences were noted, the mechanically harvested raisins received a higher rating than the hand-picked raisins. Reasons for preferring one type of raisin over another were that they had a better appearance, better flavor, higher moisture, or better texture (table 19).

The proportion of respondents indicating that they would buy the mechanically harvested raisins was higher than the proportion who said they would buy the hand-picked raisins (table 20).

Of all the persons who ate the raisins, only a small proportion indicated a dislike for them and there were fewer complaints about the mechanically harvested raisins than about the hand-picked raisins. Reasons for disliking one type of raisin over another were that they were too dry, were tasteless or odd tasting, had a color or size variation, were too tough or too soft.

Other methods of drying grapes in conjunction with mechanical harvesting are also being investigated. One of these methods consists of precutting the fruit-bearing canes followed by a spray treatment of the grapes that allows on-the-vine drying followed by mechanical harvesting. Economic and consumer evaluations of raisins produced by this method are now being conducted. The results of these tests will be considered by growers in making their decision of whether or not to shift from traditional methods of harvesting to mechanical harvesting.

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[3] Guadagni, Dan. Taste and Appearance Results on Raisins Prepared at California State University at Fresno (1971 Season). Western Regional Research Center, Albany Calif. 1972. Unpublished.

[4] R. Corkern of the National Economic Analysis Division, Economic Research Service, assisted with this study by conducting the evaluations in New Orleans.

Table 17.--Use of raisins and preferences

Item	South		West	
	Mechanically harvested	Hand picked	Mechanically harvested	Hand picked
How used	Percent 1/			
Eaten out of hand	99	99	98	98
In baked goods	36	40	37	34
In salads	36	26	25	21
In cold cereal	44	45	29	17
In hot cereal	13	6	15	17
Other	4	4	3	2
Preferences				
Eaten out of hand				
Liked the same	48	46	56	45
Liked better	40	28	26	25
Liked less	12	26	18	30
In baked goods				
Liked the same	57	52	75	69
Liked better	36	35	23	17
Liked less	7	13	2	14
In salads				
Liked the same	68	65	59	59
Liked better	32	20	37	23
Liked less	0	15	4	18
In cold cereal				
Liked the same	59	56	71	61
Liked better	35	25	16	22
Liked less	6	19	13	17

1/ Some respondents used the raisins in more than one way.

Table 18.--How respondents rated raisins in second sample in comparison with raisins in first sample.

How raisins in second sample compared with first sample	South	West
	Percent	
Second sample mechanically harvested		
Liked both samples the same	39	26
Liked second sample best	35	39
Liked first sample best	26	35
Second sample hand picked		
Liked both samples the same	25	36
Liked second sample best	27	26
Liked first sample best	48	38

Table 19.--Distribution of respondents preferring one type of raisin over another 1/

Reasons preferred raisins	South		West	
	Liked mechanically harvested best	Liked hand picked best	Liked mechanically harvested best	Liked hand picked best
	Percent 2/			
Better appearance	9	3	6	2
Better flavor	12	8	13	9
More moist	14	9	11	11
Better texture	8	6	7	5

1/ Omits respondents who liked both types of raisins about the same.
2/ Percent of total sample. Some respondents gave more than one reason for liking the raisins.

Table 20.--Other characteristics

Item	Unit	South		West	
		Mechanically harvested	Hand picked	Mechanically harvested	Hand picked
Would you buy the raisins?					
Yes	Pct.	71	63	59	44
Maybe	"	19	22	31	23
No	"	10	15	10	33
Persons who disliked the raisins	"	7	15	14	19
Persons who ate the raisins	Number	254	254	340	340
Why did you dislike the raisins?					
Too dry	Pct. 1/	14	21	17	20
Tasteless, odd taste	"	9	13	11	26
Color or size variation	"	6	12	3	9
Too tough or too soft	"	5	5	6	9

1/ Percent of total sample. Some respondents gave more than one reason.